

# RaktaSeva—An App for Civilians and Blood Banks



Akash Singh, Vidhi Punjabi, Samiksha Bedekar, and Anand Khandare

**Abstract** According to the WHO i.e., World Health Organization, a target of 10–20 donors per 1,000 persons in any country is required to ensure adequate blood supplies. Traditionally, it is identified and observed that whenever a person has a requirement of blood, they either approach a blood bank or a blood donor with the same blood group. However, it becomes difficult to find a suitable blood donor during the time of emergency requirement of blood. Moreover, availability of the suitable blood group is not guaranteed even in a blood bank. We aim to propose an app that connects the recipient of the blood to its donor in the time of crisis and provides the flexibility of finding the blood banks near them based upon their location. The app can help to increase the possibility for a patient to get a blood donor as the requestor will be connected to all eligible donors sharing the same blood group in the same city. Thus, providing an expanded search space to the person who is in the need of blood. The application makes sure that the important crucial information of the registered users is kept private and confidential before the confirmation from both parties. The application can also be used by organizations such as blood banks or non-profit service organizations that aim to search for blood donors for their blood donation camps and create awareness to a broader mass by creating digital campaigns for their blood donation drives.

**Keywords** Blood · Blood banks · Donors · Requestors · Location

## 1 Introduction

Even with a huge population, our nation stares right into the demand–supply crisis of blood units and this prevails in several medical facilities in the country. In 2012, WHO reported that despite the demand on blood units being 12 million, only 9 units are available annually. Unavailability of proper facilities for handling the blood stock in various localities have led to wastage of blood in some regions whereas at the same

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A. Singh · V. Punjabi · S. Bedekar · A. Khandare (✉)  
Department of Computer Engineering, Thakur College of Engineering and Technology, Mumbai, India  
e-mail: [anand.khandare@thakureducation.org](mailto:anand.khandare@thakureducation.org)

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time there is lack of blood donors which causes scarcity of blood stocks in other regions of the country. Hence, with the help of our app we instill some motivation in the minds of people to voluntarily donate. There already exist a few blood donor finder applications but they require time and manpower as they just provide details and donors are needs to be contacted manually. The Problem definition is, “to develop a blood donor connect app which can help a person to connect with the potential blood donors in the vicinity of a particular hospital without the need of contacting every person individually.” Registered user (Requestor) finds all available and eligible donors in the vicinity.

## 2 Literature Survey

The author presented an application for voluntary blood donors in [1], the main goal of which is to notify Rh++ of the donor location on a regular basis. Rh++ is a smart information system with the goal of regulating blood donation and supply. The donors were initially confirmed, which was one of the paper’s merits. The user can donate blood after receiving authorization. The possible shortcomings which could be considered was that GPS capabilities were not used by this particular application for donations.

Eahtesam and Raaz [2] was a general health centric application that kept record of medical history of patients. With the help of Global Position System i.e., GPS it found the donors in the locality where the patient was currently present. The location of the donor was kept up to date, making it easy for the patient to find donors. This reduced the amount of memory used and the volume of contact with the user were both reduced.

In [3] when blood is required in an emergency, we can use GPS to locate a nearby blood donor. Whenever any user enters his/her blood group, the application automatically locates a nearby blood donor and send an alert request message to the potential donor. And if the first donor is unavailable, the system will automatically search for the next available potential donor available in the queue. If the donor accepts the request, the donor will receive a one-time password (OTP) to validate his or her identity (Table 1).

## 3 Existing Systems

### 3.1 *Friend2Support.org*

This application is very popular in India. Also has support for Nepal, Bangladesh. Sri Lanka. It stores the record of all the donors registered on the platform. Whenever a patient needs a donor, they can access the details of donors in their vicinity and

**Table 1** Comparison of carious tables

Paper	Findings/Merits	Gaps identified/Demerits
[1]	<ul style="list-style-type: none"> <li>– Users are verified</li> <li>– History of the patient is maintained</li> <li>– Secure</li> </ul>	<ul style="list-style-type: none"> <li>– No tracking features</li> <li>– Accessibility issue concerned issue for the application is limited to social media</li> </ul>
[2]	<ul style="list-style-type: none"> <li>– Tracking is available</li> <li>– Minimized memory consumption and user interaction</li> <li>– Checks the medical records of the donor</li> </ul>	<ul style="list-style-type: none"> <li>– Not secure as it gives out information</li> <li>– Available only as an Android Application</li> <li>– The donor is in contact with the hospital, but a patient in need cannot request for blood individually</li> </ul>
[3]	<ul style="list-style-type: none"> <li>– Use of GIS (Geographic information System) technology</li> <li>– Users are verified</li> <li>– Secure</li> </ul>	<ul style="list-style-type: none"> <li>– No method of checking authenticity of users</li> <li>– Strenuous on the admin</li> </ul>

contact the donors accordingly. Donors can be contacted through SMS, call, or email. But the details of the user are always accessible which can also jeopardize the user’s personal information. The users also have to be manually contacted through a given medium and there is no automatic notification option. It is not a viable option during times of emergency.

### 3.2 *Save Life Connect*

This app works on similar grounds of the above app. It displays fundraisers going on and people willing can contribute to the cause. The person in need of a donor creates a request which is posted on the application feed. Unless the user is connected to the internet the request is not sent or received. After receiving the request, the donor can contact the person in need. It enables a GPS tracker to make it easier for the user to track down the request. However, the user’s medical records/history is not maintained. Due to this donor receive requests even after recent donations. The reach of this application is minimum in India.

### 3.3 *e-RaktKosh*

This is a government approved website which focuses on Blood Banks. It stores details of blood banks all over the country and displays the updated blood unit stocks. This enables people in need of blood to access their nearby blood banks and blood availability according to their blood group. Furthermore, there is also an option for live tracking the blood bank location with the use of maps. This makes it easier for

the people to reach the blood bank in stipulated time. A blood donor can also look for camps and blood banks for blood donation through the portal.

## 4 Proposed Work

The system is proposed to work for mainly two stakeholders: civilians i.e., normal users and the second i.e., blood banks and service organizations. Whenever a patient need blood, he can search for registered users in his immediate area. When a person agrees to help, he or she provides their one-time location with the requestor so that the requestor can connect with the nearest donor in the shortest span of time. The system must also ensure that the donors on the list of donors are both available and eligible, implying that the user has made himself available for any such assistance and is qualified to donate blood on medical grounds. The requestor only needs to provide the patient's information, and the information about potential eligible donors of the city will be retrieved from the database. Apart from this user's data which is used to identify and fetch potential donors the database must also be leveraged with the data of blood banks across country with their complete details i.e., city, address, contact information and blood bank category. This data will be helpful for the users in order to get the details of potential blood banks in their city and in their respective locations where they can look for blood.

In order to use the portal, it is taken into consideration that important medical or private details are not asked from the users so that there could be minimal hesitation among the users to register on the portal. Only details which are asked here are only their blood group, contact number, and address, which would be requested from everyone registering on the portal.

While requesting for blood, the requestor has to submit the details of the patient and the admitted hospital's location and with a single click of a button, a system-generated SMS and a post will be distributed to all recipients' feeds. Once the recipient receives the request, he can confirm it using the options given to him, and the request can be recorded as served on the platform once the blood donation process is completed.

Blood banks can utilize the portal to create donation requests for their diminishing blood stocks and to build campaigns for their blood donation drives directly through the portal. There are various service groups that work in the field of blood donation awareness and the implementation of blood donation camps in addition to blood banks (Fig. 1).

## 5 Implementation

The implementation for user side includes the development of an in order to build the functionality for the user side a web application is developed. The system which

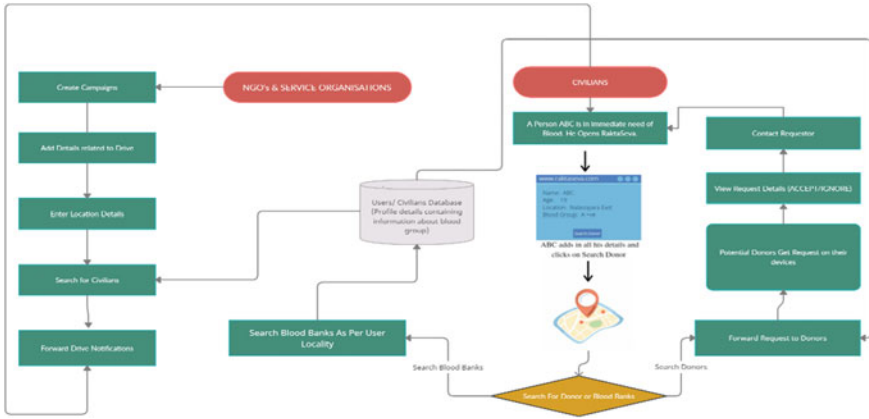


Fig. 1 Architecture overview for working principle of the proposed system

is developed registers the users on the portal and ask for the basic details of the user which includes some of the medical details like blood group and age. Now these details are used to create the database of the potential of the donors registered on the portal. These details are further used to find the donors in the closest vicinity of the hospital (Fig. 2).

Now whenever a concerned person needs blood, he/she will just fill the basic minimal details of the person for whom the blood is requested along with the hospital details to find the closest potential donors. The system will further look for the potential donors with the help of the database maintained already. Next the requester just needs to click a Message button using which an auto generated Text SMS which

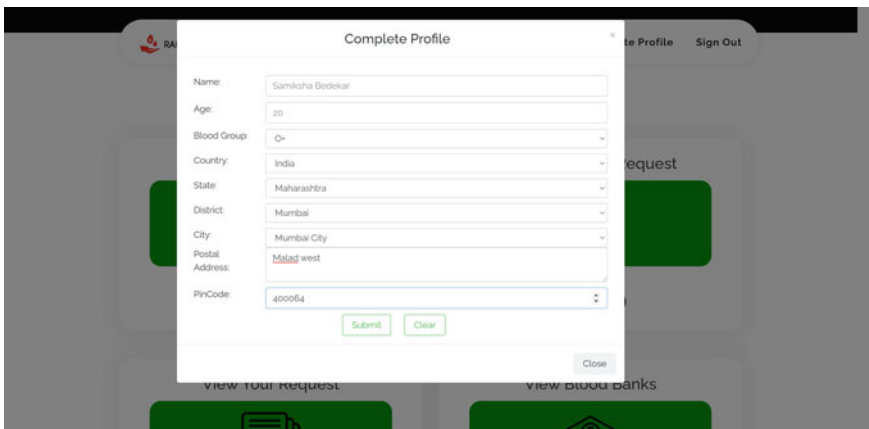


Fig. 2 Profile details requested from a registered user

Fig. 3 A minimal help form to fill necessary details for making request

will be sent to all those users whose details are matching with the detailed specified in the request (Fig. 3).

Doing this the requester will get to know how many people were connected through his request however the details of the users are not revealed to him/her as long as authenticity of the request is validated. The users who have received the messages get the hospital details mentioned in the message through which they can check for the authenticity of the request.

The system was implemented with a python backend where the business logic was developed using Python's Django Framework based upon MVT i.e., Model View Template Architecture. MVT is a software design for developing web applications. Model acts as an interface for our data and it is the logical structure of our system and is represented by database such as MySQL, PostgreSQL. In our case we have dB SQLite which is default database setup for Django Framework. The Views in this MVT architecture are used to create link between Template files and Model Data. Views in our case plays the same role which is played by Controller in MVC Architecture. The API used here is Twilio API which is a Programmable SMS API which helps us send and receive SMS messages. The Twilio provides this API service on premium basis however as long as we use it on trial basis, we need to verify each and every person registered on portal on Twilio's portal as well (Fig. 4).

**Fig. 4** Twilio API architecture



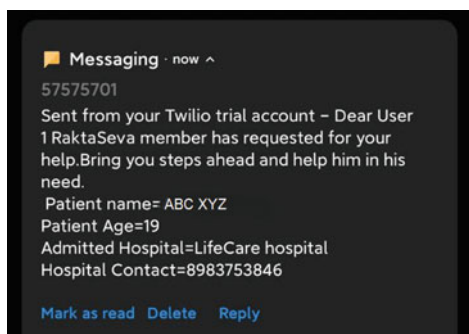
## 6 Result and Discussion

The implementation resulted into the development of important modules which forms the entire architecture for the proposed system. Whenever a request is placed, a text SMS consisting of all required details are sent over potential donors registered phone numbers so that any request originated through the portal reaches the potential donors even though they are not using their internet connectivity. This makes a major improvement in existing systems which are totally an online model and every aspect of it depends on online connectivity of users (Fig. 5).

Along with the text SMS received on recipient mobile numbers. A detailed request ticket is also created on the portal for recipient side where they can view the entire details, and can show their willingness to help if they want. The ticket consists of an accept request button which notifies the user that their one-time location and mobile number will also be sent along with their acceptance consent so that requestor can initiate further communication or not depending upon location feasibility of donors (Table 2).

The requestor can view the distance between their current location and donor via using google maps API which helps the requestor to understand whether the potential donor can reach to them in optimal time or can choose among the multiple volunteer donors depending upon their fast reach.

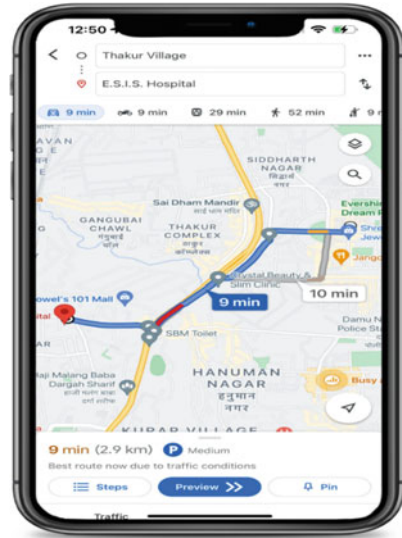
**Fig. 5** Text SMS received by the potential donor



**Table 2** Comparison of system functionality

Parameters	RaktaSeva	Save life connect	e-RaktaKosh
Responsive	✓	×	✓
GPS	✓	✓	✓
Blood bank data	✓	×	✓
Data privacy	✓	✓	✓
Auto requesting	✓	✓	×

**Fig. 6** Estimating donor reach using Google Maps Route based feature



The median latency for the APIs like Places API, Maps JavaScript API and Direction API is well within the optimal range indicating that the request is fulfilled quickly. The Geocoding API provides a higher latency value. The 95-percentile latency indicates a higher range for the results generated by the API.

Along with this request module the blood bank list can also help the requestor to connect to their nearest blood bank and check for the required blood stock availability. The database created for the blood banks helps for quickly fetching out the blood banks details throughout and connect with them as fast as possible (Fig. 6).

## 7 Conclusion

In conclusion, we foresee that the dedicated applications and platforms which can help the requestors get in touch with potential donors, nearby blood banks can bring about a revolutionary change in the blood donation trends in India. Also, as the



system can work in collaborations with civilians, blood banks as well as service organizations it can provides much wider possibility for the application to scale. It will facilitate finding donors in emergencies when the blood bank is out of reach and blood banks with complete details. Furthermore, the use of GPS will enable the patients to find potential donors in their vicinity so that the process can be speedy. With one click a person in need can contact all the donors in the neighborhood. While doing so the privacy of app users is always ensured. As a portal is free to use it can reach maximum people and benefit them. Overall, this application will play a major role in saving people's lives.

## 8 Future Scope

The system can also be seen working with the inclusion of artificial intelligence and machine learning where donors learning patterns can be learnt and understood in order to enhance the capabilities of the system in order and connect them with the most suitable donors.

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